SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title : **AC Circuits and Machines**

Course No.: **ELR109**

Program: **Electrical / Electronics / Instrumentation Technician**

Semester: **Two**

Author(s): **A. Gooderham, 7592554 ext 581**

Date: **Jan. 1999**

Previous
Outline Dated: **Jan. 1998**

Approved: K. DeRosario — Jan. 6/99

Dean — Date

Course Name: AC Circuits and Machines
Course No.: ELR109

TOTAL CREDITS: 4

PREREQUISITES: ELR 100

COURSE LENGTH: 16 wks

TOTAL CREDIT HOURS: 5

I. COURSE DESCRIPTION

An analytical study of series and parallel, and series-parallel AC circuits, impedance networks, network theorems and poly-phase circuits. Fundamentals of DC circuit analysis in RC circuits is followed by AC analysis techniques in RL, RC and RLC circuits. An overview of the basic construction and operation of DC and AC machines completes the course content.

II. TOPICS TO BE COVERED:

1. Capacitance
2. RC DC Circuits
3. AC fundamentals (review)
4. Phasors & Complex Numbers
5. RL , RC & RLC AC Circuits, Resonance & Filters
6. Series-Parallel AC Circuits
7. Power in AC Circuits
8. AC Networks
9. Three-Phase AC Systems
10. Transformers
11. AC Motor/Generators
12. Three-Phase AC Motors (if time permits)

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Course No.: ELR109

III. LEARNING OUTCOMES AND ELEMENTS OF PERFORMANCE:

A. Learning Outcomes:

Upon successful completion of this course the student will be able to:

1. Analyse fundamental RC, DC circuits
2. Analyse fundamental single-phase ac circuits
3. Analyse fundamental three-phase ac circuits
4. Describe basic parts and operation of dc and ac machines

B. Learning Outcomes with Elements of Performance:

Upon successful completion of this course, the student will demonstrate the ability to:

1. Analyse a DC circuit containing capacitors and resistors, to determine charge and discharge characteristics

Potential elements of the performance:

- Completion of RC cct questions regarding time constants
- Completion of RC cct questions requiring the solution of the time for threshold voltage or current achievement
- Completion of test

2. Determine the impedance and operation of single-phase AC circuits using phasors and complex math.

Potential elements of the performance:

- Completion of complex math questions including the j operator
- Completion of basic trigonometry questions
- Completion of polar and rectangular conversions
- Analysis of single-phase circuit operation using complex math, to find impedance(s), voltage and current values
- Complete formal test

3. Analyse a three-phase cct with respect to type (Delta or Wye) and solve for both line and phase voltages and currents.

Potential elements of the performance:

- Completion of three-phase cct questions regarding line and phase values
- Completion of three-phase cct questions having combinations of delta and wye generators and impedance loads
- Completion of test

4. Analyse AC motor and generator characteristics, parts and power factor correction.

Potential elements of the performance:

- Completion of AC machine diagrams identifying parts of the machine
- Description of AC machine operation and characteristics
- Completion of power factor correction calculations and relationships
- Completion of test

IV. REQUIRED STUDENT RESOURCES:

- **Electric Circuits Fundamentals, 4th Ed. , by Floyd**

Course Name: AC Circuits and Machines
Course No.: ELR109

V. METHODS OF EVALUATION:

The following Grading System will be used:

A+ = 90% - 100%
A = 80% - 89%
B = 70% - 79%
C = 60% - 69%
R = less than 60% (Repeat Course)
X = Temporary Grade as per College Policy

Three Tests @ 33 % each + **Review Assignment** @ 1% **: TOTAL 100%**

VI. SPECIAL NOTES:

1. The Instructor reserves the right to modify the course as is deemed necessary to meet the needs of the students.

2. Students with special needs (Physical Limitations, Visual/Hearing Impairments etc.) are encouraged to discuss confidentially, required accommodations with the instructor and/or contact the Special Needs Office, Room E1204, Extension 493, 717 or 491.

3. If a student misses a test or surprise quiz (maximum 5% of final grade) without contacting the instructor, the Dean's office or the switchboard prior to the test or quiz, a mark of zero will be granted without a re-write option.

VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in this course, should consult with the Professor

ELR109 Course Outline Review

The following students attended the class session in which the course outline was reviewed and have been notified that a copy of the outline is listed on the "scorpion" server for their perusal. Should a hard copy be preferred by a student, a printout may be taken from that location.